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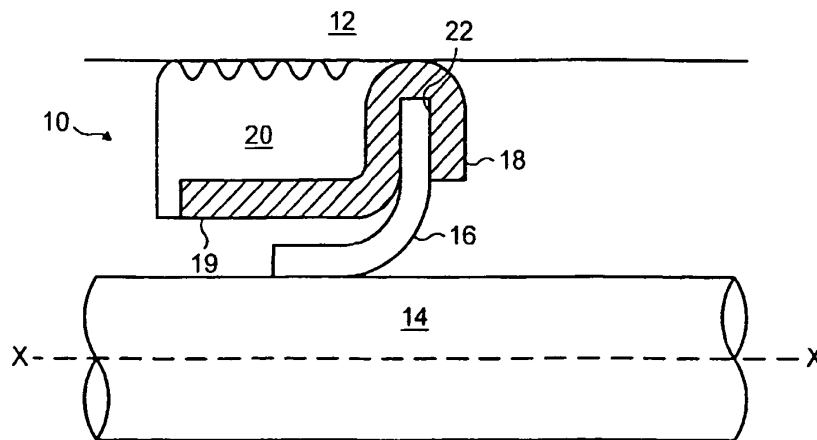
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

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(54) Title: SEAL



(57) Abstract: A rotary seal between first and second concentric surfaces (12, 14), comprises a carrier (18) and a sealing ring (16) secured at a first edge to the carrier (18) so that the sealing ring (16) extends therefrom and is deflected by and seals with said second concentric surface (14), characterised in that the carrier (18) has a sealing member (20) attached to it to seal with said first concentric surface (12). The second edge of the sealing ring (16) may be deflected inwards or outwards of the sealing member (20). The sealing rings (16) may be provided extending in opposite directions. Alternatively, a rotary seal forms a seal between the end of a shaft (212) and an adjacent surface (214) which extends laterally of the shaft axis, the rotary seal comprising a carrier (216) adapted to fit the end of the shaft (212) and a sealing ring (218) secured at a first edge to the carrier (216) so that the sealing ring (218) extends therefrom and is deflected by and seals with said adjacent surface (214), characterised in that said first edge of the sealing ring (218) is located around the circumference of the shaft (212) and extends towards said adjacent surface (214).

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SEALTechnical Field

The invention relates to a seal and the manufacture thereof. In particular, the invention relates to a seal between relatively rotatable parts.

Disclosure of the Invention

According to one aspect, the invention provides a rotary seal for forming a seal between first and second concentric surfaces, the rotary seal comprising a carrier adapted to fit said first concentric surface and a sealing ring with two radially spaced edges, the sealing ring being secured at a first edge to the carrier so that the sealing ring extends therefrom and is deflected by and seals with said second concentric surface, characterised in that the carrier has a sealing member attached to it to seal with said first concentric surface, and the sealing member is located substantially within the radial thickness of the carrier.

According to another aspect, the invention provides a rotary seal for forming a seal between the end of a shaft and an adjacent surface which extends laterally of the shaft axis, the rotary seal comprising a carrier adapted to fit the end of the shaft and a sealing ring with two radially spaced edges, the sealing ring being secured at a first edge to the carrier so that the sealing ring extends therefrom and is deflected by and seals with said adjacent surface, characterised in that said first edge of the sealing ring is located around the circumference of the shaft and extends towards said adjacent surface.

The invention thus provides a rotary seal which is particularly suited to use in a situation where there is only a relative small clearance between the surfaces between which the seal is to be established.

In a preferred embodiment, the carrier may comprise a metal ring with a recess to receive one edge of the sealing ring. The carrier may be folded or pressed or otherwise formed around the edge of the sealing ring.

The carrier ring may also be formed with a flange to which the sealing member is attached. The flange may be concentric with said first and second concentric surfaces.

The sealing ring may be supplemented by a second axially adjacent sealing ring, or a single split sealing ring may be used having two sealing lips. The or each sealing ring may be made of PTFE, may be shaped as a washer, or may be provided with hydrodynamic grooves.

Where the rotary seal comprises a sealing member, the sealing member may be made from rubber or an elastomer.

By way of example only, the invention will now be described with reference to the accompanying figures, in which:

Description of the Drawings

Figure 1 shows an axial part section of a rotary seal according to a first embodiment of the invention;

Figure 2 is a similar view to that of Figure 1 showing the sealing ring in a different configuration;

Figure 3 shows an axial part section of a rotary seal according to a second embodiment of the invention having two sealing rings;

Figure 4 shows an axial part section of a rotary seal according to a third embodiment of the invention;

Figure 5 is a similar view to that of Figure 4 showing the sealing ring in a different configuration; and

Figure 6 shows an axial part section of a rotary seal according to a fourth embodiment of the invention.

Description of Embodiments of the Invention

In Figure 1, a rotary seal 10 is shown installed in an annular gap between an outer cylindrical housing 12 and a shaft 14, which is concentric with and rotates about the axis of concentricity X-X. The ring seal 10 extends radially, relative to the axis of the annular gap between the shaft 14 and the housing 12.

The seal 10 comprises an annular sealing ring 16 which is composed of PTFE. The sealing ring 16 is held in an annular metal carrier 18 pressed from sheet metal and formed with a groove 22 to receive the outer edge of the sealing ring and grip it by crimping. The sealing ring 16 extends radially inwardly of the carrier 18 and is deflected axially by the shaft 14 so that one side of the sealing ring 16 makes sealing contact with the shaft 14.

The carrier 18 also comprises a flange 19 which extends axially within the annular gap. The flange 19 serves as a support upon which an annular sealing member 20 is formed. The sealing member 20 is comprised of rubber or elastomer and provides a sealing contact with the surface of the housing 12 to complete the sealing action between housing 12 and shaft 14.

The outer surface of the sealing member 20 may be shaped, for example, formed with circumferential ribs, to assist fitting within and sealing to the housing 12.

In Figure 1, the sealing ring 16 is shown deflected inwards of the flange 19 and sealing material 20. However, Figure 2 illustrates an alternative configuration in which the sealing ring 16 is shown deflected outwardly of the flange 19 and sealing material 20; the axial dimension of the rotary seal in use then being increased.

Figure 3 shows a rotary seal 100 accommodating two sealing rings 16a and 16b. Both of the sealing rings are crimped within the groove 22. The free ends of the sealing rings 16a and 16b extend in opposite directions over the surface of the shaft 14.

Whereas Figures 1 to 3 show annular rotary seals, Figures 4 to 6 illustrate seals between the end of a shaft and an adjacent surface extending substantially perpendicular to the shaft axis X-X.

In Figure 4, a rotary seal 200 forms a seal between an axial end face 210 of a rotating shaft 214 and an adjacent plane surface 212. The seal 200 comprises a metal carrier 218 mounted on the end of the shaft 214. The carrier 218 is formed as a sheet metal ring with an outer peripheral rim to fit around the circumferential side of the shaft and provide a groove 222 to receive an annular sealing ring 216 composed of PTFE. The groove 222 is crimped around the edge of the sealing ring 216. The free end of the sealing ring 216 deforms against the surface 212 and establishes the sealing action. Since the groove 222 holding the sealing ring is disposed around the circumferential side of the shaft 214, the sealing ring 216 is more easily accommodated in the limited space available when the sealing gap between the end 210 of the shaft and the adjacent surface 212 is relatively small.

In Figure 5, the arrangement differs from that shown in Figure 4 in that the free end of the sealing ring 216 now extends inwards of the end of the shaft 214 rather than outwards as in Figure 4.

In Figure 6, the arrangement differs from that shown in Figure 4 in that two sealing rings 216a and 216b, are fitted in the groove 222 and extend in opposite directions over the surface 212.

In the seals of Figures 4 to 6, the carrier 218 may be provided with an elastomeric layer between itself and the shaft 214, preferably around the circumferential side of the shaft only, to create a seal at that interface, instead of relying on contact between the carrier and the shaft 214 for that purpose.

CLAIMS

1. A rotary seal for forming a seal between first and second concentric surfaces (12,14), the rotary seal comprising a carrier (18) adapted to fit said first concentric surface (12) and a sealing ring (16) with two radially spaced edges, the sealing ring (16) being secured at a first edge to the carrier (18) so that the sealing ring (16) extends therefrom and is deflected by and seals with said second concentric surface (14), characterised in that the carrier (18) has a sealing member (20) attached to it to seal with said first concentric surface (20), and the sealing member (20) is located substantially within the radial thickness of the carrier (18).
2. A rotary seal as claimed in claim 1 in which the carrier (18) is formed with a flange (19) to which the sealing member (20) is attached.
3. A rotary seal as claimed in claim 2 in which the flange (19) extends generally in the direction of the axis of the first and second concentric surfaces (12,14).
4. A rotary seal as claimed in claim 2 in which the flange (19) is concentric with the first and second concentric surfaces (12,14).
5. A rotary seal as claimed in any of the preceding claims in which the second edge of the sealing ring (16) is deflected inwards of the sealing member (20).
6. A rotary seal as claimed in any of the preceding claims in which a second sealing (16a, 16b) is secured to the carrier (18) to extend therefrom and form a seal with said second concentric surface (14).
7. A rotary seal as claimed in claim 6 in which the sealing rings (16a, 16b) extend radially from the carrier (18) and away from one another.

8. A rotary seal for forming a seal between the end of a shaft (212) and an adjacent surface (214) which extends laterally of the shaft axis, the rotary seal comprising a carrier (216) adapted to fit the end of the shaft (212) and a sealing ring (218) with two radially spaced edges, the sealing ring being secured at a first edge to the carrier (216) so that the sealing ring (218) extends therefrom and is deflected by and seals with said adjacent surface (214), characterised in that said first edge of the sealing ring (218) is located around the circumference of the shaft (212) and extends towards said adjacent surface (214).
9. A rotary seal as claimed in claim 8 in which the sealing ring (218) extends towards the facing surface (214) and inwardly of the shaft as it is deflected by and seals with the facing surface (214).
10. A rotary seal as claimed in claim 8 or 9 in which a sealing member is attached to the carrier to seal with the shaft (212).
11. A rotary seal as claimed in any one of the preceding claims in which said first edge is secured in a recess (22) in the carrier.
12. A rotary seal as claimed in claim 11 in which the carrier (18) is formed with said recess (22) so that it can be closed to grip said first edge therein.
13. A rotary seal as claimed in any one of the preceding claims in which the carrier (18) is formed as a metal ring.
14. A rotary seal substantially as herein described with reference to Figures 1 and 2; Figure 3; Figures 4 and 5; or Figure 6 of the accompanying drawings.

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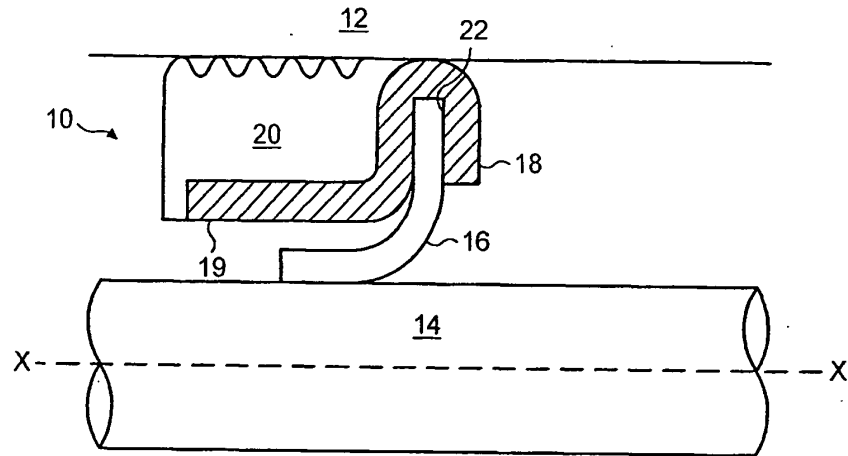


FIG. 1

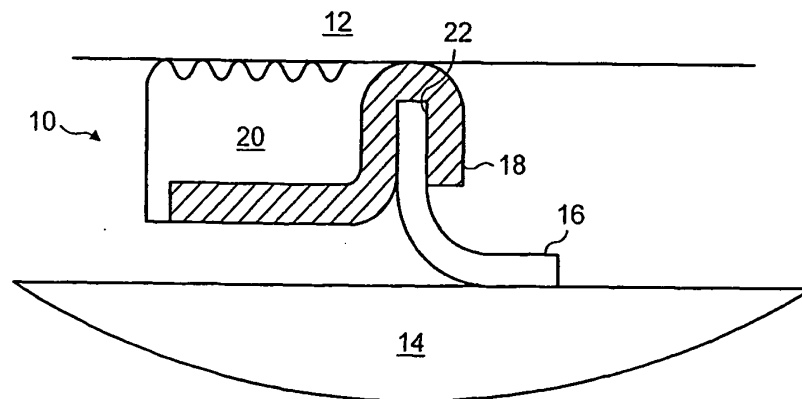


FIG. 2

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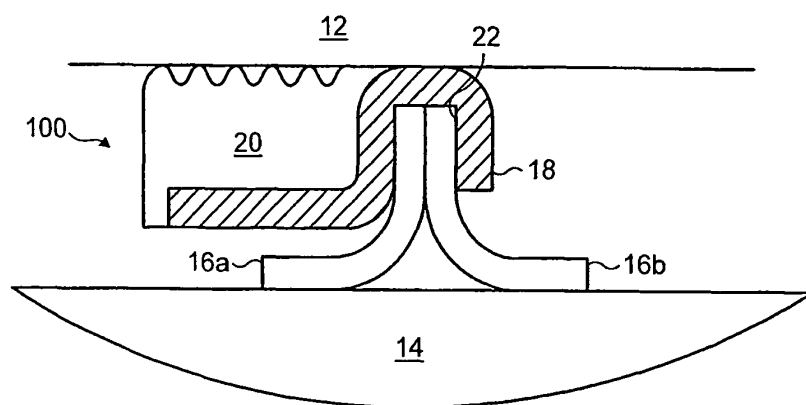


FIG. 3

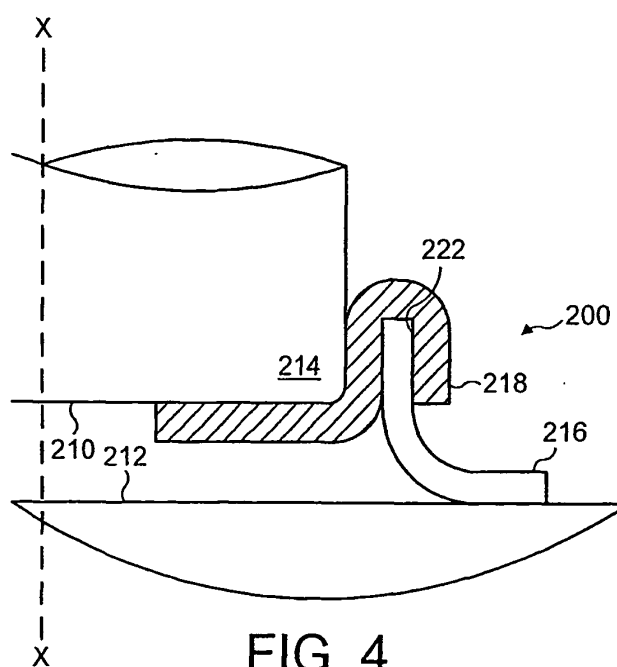


FIG. 4

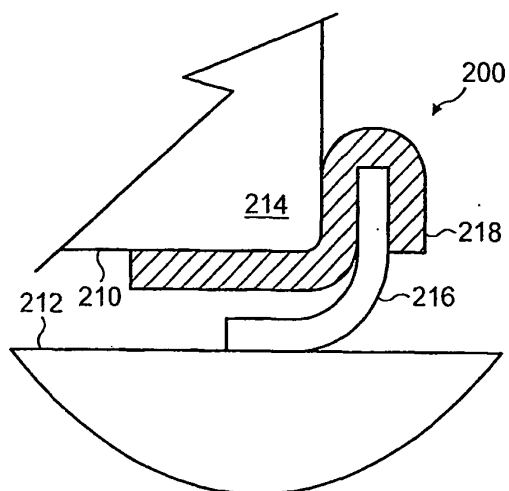


FIG. 5

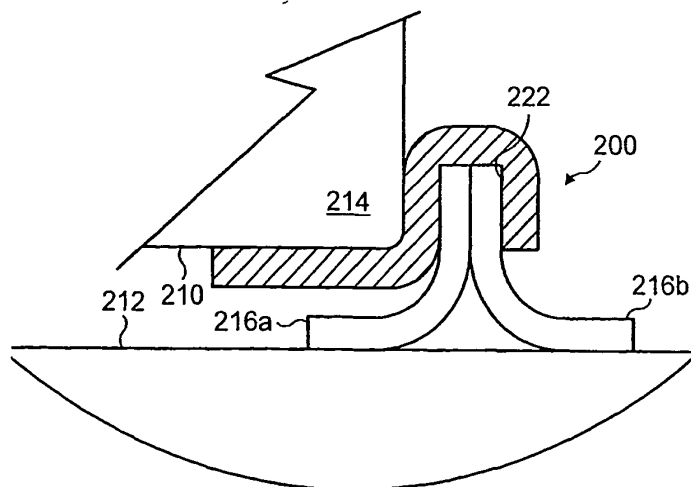


FIG. 6

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 01/02301

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 F16J15/32 F16J15/34

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 F16J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 602 792 A (TRIST & CO LTD RONALD;LEONARD BOMYER) 2 June 1948 (1948-06-02) page 2, line 87-130 figures 2-4	1-8, 10, 13
Y	---	9, 11, 12
Y	US 2 316 941 A (DODGE HOWARD M) 20 April 1943 (1943-04-20) page 3, column 1, line 36-47 figures 7, 8	9
Y	GB 2 259 740 A (DOWTY SEALS LTD) 24 March 1993 (1993-03-24) claim 1 figures 1A, 1B, 1C, 2	11, 12

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

12 September 2001

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INTERNATIONAL SEARCH REPORT

information on patent family members

International Application No

PCT/GB 01/02301

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
GB 602792	A	02-06-1948	NONE	
US 2316941	A	20-04-1943	NONE	
GB 2259740	A	24-03-1993	CN 1071236 A WO 9306394 A1	21-04-1993 01-04-1993

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